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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/003,363	11/15/2001	Yukiko Kubota	010952	4664

23464 7590 02/24/2003

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EXAMINER

BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 02/24/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/003,363

Applicant(s)

KUBOTA ET AL.

Examiner

Kevin M Bernatz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☒ Claim(s) 4-6 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other: ____.

DETAILED ACTION

Examiner's Comments

1. The limitation "approximately" or "about" 0 – 5 nm thick in claims 2, 5 and 6 has been interpreted to exclude the value 0 (i.e. >0 to "about 5 nm) since the claims positively recite that the tantalum or non-magnetic spacer layer exists.
2. Claim 4 has been interpreted in view of the specification which only provides support for the iron-cobalt alloy to be deposited adjacent to the non-magnetic spacer material on the substrate, not for the two non-magnetic layers to be adjacent to each other (i.e. substrate/non-magnetic/{FeCo alloy/Ta} instead of substrate/non-magnetic/{Ta/FeCo alloy}).
3. Claim 8 has been given its broadest reasonable interpretation given that the claim that claim 8 depends from requires the alloy to include iron, cobalt and boron. As such the alloy cannot be exactly 65% iron and 35% cobalt, since claim 1 requires that the alloy comprise "iron, cobalt and boron".

Specification

4. The disclosure is objected to because of the following informalities: Paragraph 27 refers to an unnamed copending application. Appropriate correction is required.

Claim Objections

5. Claim 4 is objected to because of the following informalities: insert a space between "claim" and "3". Appropriate correction is required.
6. Claim 5 is objected to because of the following informalities: "that" before "iron-cobalt" appears to be a typographical error and should be deleted or replaced. Appropriate correction is required.
7. Claims 5 and 6 are objected to because of the following informalities: SUL has not been previously used in the claims and should be replaced with "soft magnetic underlayer". Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
9. Claims 11, 15 – 20, 22 – 25, 27 and 28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
10. Claim 11 recites the limitation "on the second non-magnetic spacer material" in line 2. There is insufficient antecedent basis for this limitation in the claim since claim 7 does not require a second non-magnetic spacer material. For purposes of evaluating the prior art, this claim was interpreted as reading "...as recited in claim 7, further comprising a perpendicular magnetic recording layer".

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11. Claims 15 – 20, 22 – 25, 27 and 28 are method claims that refer back to product claims (i.e. claim 15 refers to “claim 11”, claim 16 refers to “claim 12”, etc). It is unclear from which claims these claims are supposed to depend on and therefor these claims have not been evaluating versus the prior art (i.e. is claim 16 supposed to depend on claim 14 or 15?).

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

13. Claims 1, 2, 9, 10, 14 and 26 are rejected under 35 U.S.C. 102(e) as being anticipated by Shukh et al. (U.S. Patent Application No. 2002/0028357 A1).

Regarding claims 1, 9, 14 and 26, Shukh et al. disclose a perpendicular magnetic recording medium (*Title*) comprising a substrate (*Figure 2 – element 38*); a non-magnetic spacer material on the substrate (*Figure 3 – element 56*); and a soft magnetic underlayer on the non-magnetic spacer material (*Figure 3 – element 52*), the soft magnetic underlayer containing iron, cobalt and boron (*Paragraph 0026*). The examiner notes that “plurality” simply means 2 or more, so element 56 and element 52 meet the claimed limitation since they are 2 layers in total.

Regarding claim 2, Shukh et al. disclose non-magnetic spacer layer thickness values meeting applicants' claimed limitations (*Paragraph 0028*).

Regarding claim 10, Shukh et al. disclose a second non-magnetic spacer material on the soft magnetic underlayer (*Figure 2 – element 42 and Paragraphs 0024 – 0025*).

- Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 1 – 14, 21 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugita et al. (U.S. Patent No. 4,687,712).

Regarding claims 1, 9, 14 and 26, Sugita et al. disclose a perpendicular magnetic recording medium (*Title – where “vertical” is known to be equivalent nomenclature for “perpendicular”*) comprising a substrate (*Figure 10 – element 12*); a non-magnetic spacer material on the substrate (*Figure 10 – element 17*); and a soft magnetic underlayer on the non-magnetic spacer material (*Figure 10 – element 13*). The examiner notes that “plurality” simply means 2 or more, so element 13 meets the claimed limitation as shown in Figure 10.

Sugita et al. fail to disclose a soft magnetic material other than permalloy (NiFe) as the soft magnetic layers.

However, substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, NiFe and CoFeB are equivalents in the field of soft magnetic materials for use in perpendicular recording (see pertinent prior art cited below – Ikeda et al.). *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

Regarding claims 2 and 3, it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the non-magnetic spacer layer thickness and the soft magnetic underlayer thickness through routine experimentation (especially given the teachings in Sugita et al. regarding acceptable thickness values – *Figures 4 and 5; and col. 3, lines 3 – 30; col. 4, lines 1 – 8; and col. 5, lines 25 – 27 and lines 57 – 59*). *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Regarding claims 4 – 6, 12, 13 and 21, substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, Ta and Ti are equivalents in the field of non-magnetic materials used as spacer layers between adjacent soft magnetic layers or between a soft magnetic layer and a substrate (see pertinent prior art cited below – Futamoto et al., Hosoe et al.).

In addition, Sugita et al. disclose that the soft magnetic underlayers can comprise layers having the same thickness or varied (*col. 1, line 66 bridging col. 2, line 10; col. 2, lines 29 – 64; col. 4, lines 1 – 8 and lines 36 – 41; and examples*). Therefore, the exact thickness values of the soft magnetic underlayers are deemed to be cause effective

variables in terms of the reproduction output and S/N of the medium (*col. 4, lines 36 – 41*). It would therefor have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the thickness values of the various soft magnetic underlayers through routine experimentation (especially given the teachings in Sugita et al. regarding acceptable thickness values).

Regarding claims 7, 8 and 11, it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the alloy concentration through routine experimentation, especially given the knowledge in the art regarding acceptable values for the concentration of a CoFeB alloy (see pertinent prior art cited below – Kraus et al., Beatrice et al., Platt et al., Fujimura et al., and Brouha et al.).

Regarding claim 10, Sugita et al. disclose at least a second non-magnetic spacer layer (*Figure 10 - elements 15*).

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ikeda et al. (U.S. Patent No. 6,468,670 B1) teach the equivalents of NiFe and CoFeB for soft magnetic underlayers used in perpendicular media (*col. 3, lines 25 – 48 and Figure 1*). Futamoto et al. (U.S. Patent Application No. 2001/0009730 A1) and Hosoe et al. (U.S. Patent No. 5,759,681) teach the equivalents of Ti and Ta with regard to non-magnetic materials used as spacers or underlayers with soft magnetic materials (*Futamoto et al. – Figure 6; Paragraphs 0042, 0088, and 0109*;

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Hosoe et al. – col. 2, lines 3 – 5; col. 4, lines 12 – 27; col. 5, lines 21 – 22; col. 7, lines 1 – 16 and col. 8, lines 17 – 20). Kraus et al. (IEEE Trans. Mag. 30(2), 1994, 530 – 532), Beatrice et al. (IEEE Trans. Mag. 33(5), 1997, 3772 – 3774), Platt et al. (IEEE Trans. Mag. 37(4), 2001, 2302 – 2304), Fujimura et al. (U.S. Patent No. 5,466,308) and Brouha et al. (EP 303324 A1) all disclose the effects of varying the Co, Fe and/or B content, as well as providing the knowledge of acceptable values for each of these element compositions (see *underlined/high-lighted sections*). Ikeda (U.S. Patent Application No. 2001/0019786 A1) is cited as pertinent prior art since it is directed to a similar structure as applicants' claimed medium (i.e. a perpendicular recording medium with a multilayered soft magnetic underlayer) (*Figures and Paragraphs 0023, 0024, 0028 – 0030 and 0044*). The examiner notes that the Ikeda ('786 A1) reference has not been applied as prior art since applicants' provisional priority date antedates the filing date of the Ikeda ('786 A1) reference.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.



KMB
February 18, 2003



Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700